

ly fell from Nevada to eastern Washington Territory, Idaho, Montana and Dakota. 28th, No. XIX lost its identity at night in the Rocky Mountain region, while No. XVIII moved toward the Lake region with increasing energy. Rainy weather accompanied it in the Pacific coast regions, Arizona, New Mexico and the Ohio valley, and frequent snow to the northward. At Leavenworth the afternoon barometer read 29.31, or 0.70 below the normal. 29th it rapidly passed northeast to the Gulf of St. Lawrence, leaving a narrow barometric trough extending southwestward to Texas, in which rains were frequent, partly turning to snow to the northward. Maximum velocities: Pike's Peak, SW. 56; Cheyenne, W. 44; Dodge city, SW. 45; Bismarck, E. 32; Duluth, NE. 28; Milwaukee, SW. 28. on Mt. Washington, W. 105 miles. Cautionary Signals were ordered morning of the 27th for Milwaukee, Grand Haven and Ludington, on Lake Michigan, (the display of signals being ceased at the other Lake stations) but reported as not justified. Warnings were also sent for the Canadian stations, on Lakes Huron Erie and Ontario and St. Lawrence valley. Signals were also ordered the 28th for the Texas coast and Eastport, but not justified; also, warnings for Lake Huron.

No. XX.—This disturbance was central north of Minnesota and Dakota, night of the 30th; its progress southeast over the Lower Lakes on the 31st was very rapid, accompanied by fresh to very brisk winds, except on Mt. Washington, where a hurricane velocity (the highest for the month) was recorded. Snow frequently fell from the Northwest and Lake region to the St. Lawrence valley and New England, and rain thence southwestward to New Mexico and the Southwest. Maximum velocities: Virginia City, N. 30; Pembina, S. 34; Cleveland, SW. 28; Mt. Washington, W. 111 miles. Cautionary Signals were ordered, 31st, from New Jersey to Maine, and warnings sent for the St. Lawrence valley. They were only justified at scattered stations.

No. XXI.—The centre of this storm passed eastward from the Pacific coast to the north of the limit of the Signal Service stations. On the 31st rainy weather prevailed along the North Pacific coast, while high southerly winds and gales were general from thence to Montana; at Portland, Or., S. 25 miles; at Forts Shaw and Assiniboine, Montana, southerly gales; North Platte, S. 33. Its subsequent history belongs to the January REVIEW.

INTERNATIONAL METEOROLOGY.

Three International charts, Nos. IV, V and VI, accompany the present *Review*. No. IV indicates the probable course of low pressure areas over the North Atlantic ocean and neighboring waters and continents during the month of *November*, 1879; it is based upon observations made on board of nearly 200 vessels, and which have been collected from various sources or received directly at this office up to January 5th, 1880. Nos. V and VI are charts for the month of *May*, 1878, and are based upon the International Simultaneous Observations, as described in the *Review* for July, 1879, supplemented by such other observations as have been considered specially applicable and trustworthy.

On chart No. IV the tracks of seventeen areas of low pressure, which, during a portion of their existence, were located over the North Atlantic Ocean or neighboring waters, are traced. Although the number of reports at present to hand is somewhat small, they are probably sufficient to enable a good idea to be formed of the meteorological conditions existing over the North Atlantic, between the 35th and 55th parallels, during the entire month. In the following resume only the above area will be referred to unless specially noted. The month opened with areas of low pressure central respectively to the north of Newfoundland and over Norway and Sweden; the former being a continuation of low area No. IX shown on chart No. I of the October REVIEW, while the latter had apparently advanced southeastwardly to the Norwegian coast. Areas of high pressure existed over the eastern portion of the United States, moving eastwardly, and over the eastern portion of the Atlantic, moving slowly southeastwardly. On the 1st brisk to high westerly winds or gales prevailed from 65° to 45° W., and light easterly winds from 35° W. to the Irish coast. On the 2nd the pressure rose over the west Atlantic and British Isles as the high areas moved eastward and the low area north of Newfoundland northward. Westerly gales and high seas continued in the vicinity of the Banks of Newfoundland, (bark Royal Arch was abandoned in 43° N. 59° W.,) but thence eastward light or moderate southerly to easterly winds. 3rd, area of highest pressure central over the eastern Atlantic to the west of Ireland and extending its influence over all western Europe; light easterly winds between 10° and 25° W.; southwest winds and rain about 50° N., 35° W.; pressure over western Atlantic rapidly diminishing in advance of low area No. II, (low area No. I, chart I, November REVIEW.) 4th, area of highest pressure central over Ireland, (Valentia, barometer 30.67 inches or 778.2 m. m., wind SW.;) light southerly winds thence to 40° W.; low area No. II moved rapidly northeastward during the night of the 3rd and 4th, accompanied by severe weather, with fierce squalls and heavy snow or rain, from Labrador to the Banks of Newfoundland; large area of high pressure over the eastern portion of the United States, moving eastward. 5th, area of high pressure over the east Atlantic, slowly moved southward, (Valentia barometer 30.69 or 779.5, wind calm,) while low area No. III advanced southeastward over Norway; southerly gales from 30° to 45° W., in advance of low area No. II; high or rising pressure over the west Atlantic, preceded by cold northwesterly winds and heavy snow off Cape Sable. On this day, 5th, two vessels were dismasted in a hurricane (low area No. IV) in 21° N., 27° W., which probably moved in a northerly direction on the 6th and 7th, and was encountered on the latter day in 30° N. 25° W. 6th and 7th, the center of highest pressure over the east Atlantic moved southward very slowly towards the Bay of Biscay, (barometer at

Valentia about 30.70 or 780.5, and at La Corogne and Bilbao, 30.55 or 774.7;) low area No. II moved northeastward, and southerly squalls or gales veering to west and north were reported from 20° to 45° W.; high pressures prevailed over the west Atlantic, with high or variable winds. 8th and 9th the area of high pressure previously existing over the east Atlantic moved eastward over Europe, followed over the British Isles and France by cloudy, dull or foggy weather, in advance of low area No. II, which moved rapidly northeastward to the Norwegian coast, with heavy rains in the north of Scotland; extensive area of high pressure advanced eastward, and on latter day apparently extended across the Atlantic. 10th, area of high pressure moved eastward, while low area No. V rapidly moved eastward to Newfoundland; as on the two preceding days, light to moderate winds prevailed over the Atlantic. 11th, area of high pressure moving slowly southeastward; area of low pressure No. VII appeared to the north of Scotland, while low area No. V moved to the east of Newfoundland, preceded by light southerly winds to 30° W. 12th, low area No. VII covered central Europe; small area of high pressure still remaining central over the east Atlantic, preceded by northwesterly gales over the British Isles and channel; low area No. V slowly advanced eastward to mid-ocean, with increasing energy, preceded by severe southerly gales between 30° and 35° W.: S. S. "*Leipzig*," (49° 53' N., 31° 44' W., at 7.35 a. m. Wash. time) reported, bar. 29.56 or 750.8, wind south, force 9, cloudy, heavy sea from south; S. S. "*Indiana*," (50° 34' N., 31° 40' W., 7.35 a. m., Wash. time,) bar. 29.36, SSE. 9, cloudy, heavy SSW. sea; in 38° N. 42° W. a northwest hurricane was reported lasting 36 hours, vessel hove to under bare poles for 12 hours. 13th, the small area of high pressure (about 30.30 or 769.6) over the east Atlantic, moved slowly southeastward toward the Bay of Biscay, while the low area, No. V, remained almost stationary, and with diminishing pressure at the centre, over mid-ocean; S. S. "*Leipzig*," (49° 4' N., 36° 40' W., 7.35 a. m., Wash. time,) bar. 29.43 or 747.5, wind N., force 7, cross seas from N. and S., cloudy with much hail; S. S. "*Indiana*," (49° 03' N., 38° 20' W., 7.35 a. m., Wash. time,) bar. 29.20 or 741.7, NNW. force 9, heavy NW., sea and cloudy; northwesterly winds prevailed thence to the banks of Newfoundland, and northeasterly backing to northwesterly winds off the Nova Scotia coast, as low area No. VIII moved southeastwardly. 14th, as low area No. VII continued its eastward march toward Russia the pressure rose rapidly over Norway and Great Britain, and including the small area over the Bay of Biscay, formed an extensive area of high pressure covering the whole of western Europe, accompanied by quite low temperatures and clear, frosty weather; southeasterly winds and rising temperature along the Spanish and Irish coasts; the low areas Nos. V and VIII, appeared to move southward and possibly formed an extensive area of low pressure to the westward of the Azores; severe northerly gales between 40° and 50° W.; small area of high pressure over Nova Scotia, moving eastward, during the day, over the Banks of Newfoundland, with diminishing pressure. 15th, high area over western Europe, moved southward, accompanied by quite low temperatures over England, France and northeastern Spain; low area No. V (and VIII?) central near the Azores (reports from the Azores not yet to hand) as a very severe storm; in 41° N. 36° W., the "*Warren Hastings*" was thrown on her beamends during a heavy northerly gale and sea, the man at the wheel was washed overboard and the vessel afterwards abandoned; in 27° N. 36° W., Bark "*Alida*" had heavy gale from WSW., lasting 36 hours; and several vessels afterward put into Fayal for repairs, having had bulworks stove, &c., during this storm. Falling pressure over the Banks of Newfoundland in advance of low area No. IX. 16th, highest pressures over western Europe, (30.59, or 776.9, at Ushant;) low pressure over the Atlantic, with centres of depression probably southwest of the Azores, (falling pressure and rough sea at Funchal,) and to the northeast of Newfoundland. 17th, high pressures over western Europe, (30.56, or 776.1, at Rochefort,) while a small area of low pressure passed eastward north of Scotland; falling pressure, with high southeasterly winds and rough sea at Funchal; low area No. IX to the northeast of Newfoundland, accompanied by SW. to NW. gales, high seas and heavy rain, from 30° to 45° W., in about 51° N.; rising or high pressures and northerly winds thence to the coast of the United States. 18th, high pressures continued over western Europe, (30.46 inches or 773.6 mm. at Bordeaux; high southeasterly winds, falling barometer and high sea at Funchal; low area No. IX probably central about 55° N., 30° W., with increasing southwesterly winds to the southward; higher pressures and light variable winds thence to the Banks of Newfoundland; low area No. X rapidly moved northeastward from Cape Henry to south of Cape Sable as a very severe storm. S. S. "*Leipzig*," (on the 18th, at 7.35 a. m., Washington time in 43° 1' N., 59° 46' W., and 19th, same time, in 41° 42' N., 64° 40' W.) reports 18th, 8 p. m., rapidly increasing SE. wind and sea, with heavy rain, barometer falling rapidly to 29.476 or 748.8; 19th, 3:00 to 3:20 a. m., fog; 6:30 a. m., wind shifting to NNE., with rapidly increasing northerly sea and rising barometer. 19th, high pressures over the whole of northern Europe, (30.57 or 776.4 at Stockholm, and 30.40 or 772.2 at Mullaghmore;) rapidly falling pressure over Spain and at Funchal, with continued high SSE. winds and rough sea at latter place; low area No. X rapidly moved eastward, accompanied by severe weather to 30° W., but it is hardly possible to locate its center for that day, owing to the large depression which existed over that portion of the Atlantic at the time. Low area No. XI moved northeastward at some distance off the coast of the United States as a very severe storm; it was described as low area No. XII, chart No. I, November REVIEW. 20th, highest pressure over northern Europe, (Stockholm, 30.75 or 781.1 mm;) extensive area of low pressure over the east Atlantic, and rapidly falling pressure over the whole of western Europe, with the center of depression probably near Funchal; steamer Roscommon is reported to have capsized and foundered at 1.20 p. m., in 37° 40' N., 24° 12' W. Low area No. XI moved rapidly over Nova Scotia as a very severe storm, the accompanying gales extending eastward to 37° W. 21st, the two large areas of low pressure over the Atlantic were probably central near Funchal,

where the wind had shifted to a NNW. gale, with very high seas, and to the north of Newfoundland, separated by a ridge of higher pressure over mid-ocean; southerly to westerly gales attending the latter depression prevailed south and eastward to 38° N. and 40° W. On the night of the 20th a very severe "norther," accompanied by heavy rains, commenced at Aspinwall, C. A., which, according to reports, continued with great violence to the 24th, doing an immense amount of damage to shipping, wharves and railroad stock. 22nd, rising pressure over the Atlantic between 40° and 50° N., with easterly to southerly winds from the European coast to 40° W., and brisk to high westerly winds, gales and high seas thence westward to the American coast: at Funchal the wind returned to the south. A subsidiary area of low pressure No. XIII moved from near Cape Lizard, England, northeastward. 23rd, pressure probably about normal over the east Atlantic, with gentle or moderate winds: a large area of low pressure existed, however, to the southwest of Funchal, where high SSE. winds and rough seas continued: in $22^{\circ} 35'$ N. $18^{\circ} 40'$ W., bark "*Janet*" was abandoned during a gale from SW. to SSW. The record of this vessel in reference to the meteorological conditions over this part of the Atlantic is interesting: on the 7th, in $30^{\circ} 30'$ N. $24^{\circ} 40'$ W., the captain reports "a very heavy gale from the SE., which hauled to NW., (see area No. IV.) vessel was hove down, lost portions of rigging, &c., and had decks swept; after gale, tried to make Canary Islands, but the wind coming out ahead, had to keep vessel south; went along at about 200 miles a day and hoped to get the NE. trades but there were none;" vessel abandoned on 23rd as above. An extensive area of high pressure, (30.40 or 772.2 at St. Johns, Newfoundland,) covered the western Atlantic, and light to moderate winds prevailed from Valentia to the American Coast. 24th, large area of depression to the westward of Funchal, where fresh southerly winds and rough sea prevailed, while in $34^{\circ} 27'$ N., $28^{\circ} 51'$ W., a NE. gale and heavy sea were reported, during which, Bark "*Olive*" was abandoned, the crew being taken on board U. S. S. *Constellation*. The large area of high barometer moved eastward and rapidly extended its influence to Great Britain and Norway, with northerly to easterly winds, thence over the Atlantic to 45° W. An area of low pressure, (No. XIII, chart I, Nov. Rev.,) moved northeastward over Newfoundland with stormy weather, followed by a high-pressure area off the coast of the United States. 25th, large area of high pressure over northern Europe, (Stornoway, 30.50 or 774.7, and Stockholm, 30.66 or 778.7;) large area of low pressure between the Azores and Canary Islands, (Funchal, 29.57 or 751.0, SSE. winds and very high sea;) rising and moderately high pressures with light winds over the west Atlantic. 26th, high but falling pressure over northern Europe and northern part of the Atlantic, (Mullaghmore, 30.41 or 772.4;) with easterly winds from Valentia to 45° W.; large area of low pressure near the Madeira Islands, (Funchal, 29.34 or 745.1, S. gale and high sea;) secondary depression, No. XVI, formed over the western Mediterranean; low area, No. XV, to the north of Newfoundland, moving eastward; higher pressures and northwesterly winds thence south and westward. 27th, large depression, central over the Atlantic north of Funchal, extending eastward over Spain and the western Mediterranean; high area to the northwest of Ireland, gradually diminishing in extent and pressure, with easterly winds from Valentia to 35° W.; low area No. XV probably moved southeastward, but with little energy, as shown on chart; rising pressure over Newfoundland and southward, with northwesterly winds extending eastward to 50° W. 28th, area of low pressure passed eastward over Spain, while the small area of high barometer to the west of Ireland diminished in extent and pressure. At Funchal the wind changed to N. high, with rising pressure and moderating sea; easterly winds prevailed from the Irish and French coasts to 35° W., which increased to a fresh gale in 47° N., 15° W.; low area No. XV was probably central near 45° N., 40° W., but without much energy; high pressure and light winds over the western Atlantic. 29th and 30th, area of lowest pressure over the Mediterranean; high pressures north of 50° N., from 15° to 45° W., with easterly winds near that parallel; low area No. XV probably central about 40° N., 40° W., but with little energy; low area No. XVI, chart I, November Review, moved eastward north of Newfoundland on the 30th, followed by high pressures on the American coast.

TEMPERATURE OF THE AIR.

The general distribution of temperature for the month is shown by the isothermal lines and figures upon chart No. II. Upon the right side of the same chart, will be found a table, giving the average temperature by districts, for December, for several years and of this year. From New England, the Lower Lake region and Ohio valley, southwestward to the Gulf and southeastern Rocky Mountain Slope, and for Boise City, Idaho, the average is higher than usual, the greatest difference being for the South Atlantic States. At Salt Lake City it has been normal. In all the other districts it has averaged lower than usual, especially in the Missouri and Red River of the North valleys.

Minimum Temperatures.—*Maine*: -26° at *Orono and -15° at Eastport. *New Hampshire*: -26° on Mt. Washington and -14° at *Grafton. *Vermont*: -28° at Newport and -19° at Burlington. *Massachusetts*: -6° at *Amherst and 0° at Boston, and Springfield. *Rhode Island*: 7° at Newport. *Connecticut*: 2° at *Mystic and 4° at New Haven. *New York*: -24° at *Madison Barracks and *Schroon Lake, -20° at *Plattsburg Barracks, -7° at Oswego, 1.25° at Buffalo and 11° at New York City. *Pennsylvania*: -7° at *Dyberry, 3° at *Catawissa, 5° at Pittsburg and 11° at Philadelphia. *Delaware*: 18° at *Dover. *Maryland*: 6° at *Emmitsburg and 13° at Baltimore. *District of Columbia*: 13° at Washington. *Virginia*: 10° at *Wytheville and 25° at Norfolk. *West Virginia*: 7° at *Helvetia and 18° at Morgantown. *North Carolina*: 8° at *Highlands, 24° at Wilmington and 33° at Cape Hatteras. *South Carolina*: 26° at *Aiken and 34° at Charleston. *Georgia*: 17° at Atlanta and 33° at Savannah. *Florida*: 28° at Pensacola, 36° at